EC518- RISC PROCESSOR ARCHITECTURE AND PROGRAMMING

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Course Learning Objectives

· To understand the embedded system based on ARM processor and its hardware (ARM processor Core).
· To understand the techniques and rules for writing efficient C code and optimizing ARM assembly code.
· To discuss various Cache technologies and Architecture that surrounds the ARM cores and MMU.
· To Understand the architecture of ARM CORTEX-M3

Course Outcomes:

· Design an embedded system using ARM processor.
· Write source code that will compile more efficiently in terms of increased speed and reduced code size.
· Develop an embedded system with optimized key subroutines to reduce system power consumption and clock speed needed for real time operation.

UNIT –I   (8hours)
ARM Architecture

ARM Design Philosophy, Registers, Program Status Register, Instruction Pipeline, Interrupts and Vector Table, Architecture Revision, ARM Processor Families.

UNIT –II   (10hours)

ARM Programming Model – I

Instruction Set: Data Processing Instructions, Addressing Modes, Branch, Load -Store Instructions, PSR Instructions, Conditional Instructions.

ARM Programming Model – II

Thumb Instruction Set: Register Usage, Other Branch Instructions, Data Processing Instructions, Single-Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions

UNIT –III   (10hours)

ARM Programming

Simple C Programs using Function Calls, Pointers, Structures, Integer and Floating Point Arithmetic, Assembly Code using Instruction Scheduling, Register Allocation, Conditional Execution and Loops. Exception Handling , Interrupts , Interrupt handling schemes,Firmware and boot loader

UNIT –V   (12 hours)

Memory Management

Cache Architecture, Polices, Flushing and Caches, MMU, Page Tables, Translation, Access Permissions, Context Switch.

UNIT – V   (10 hours)
 ARM Cortex-M3

ARM Cortex-M3 Processor –Architecture- Instruction Set Development-The Thumb-2 Technology and Instruction Set Architecture-CORTEX-M3 Applications.

TEXT BOOKS:

1. ARM System developers guide-ELSEVIER publications

2. The indefinite guide to ARM CORTEX-M3.

REFERENCES:

1. Steve Furber, 'ARM system on chip architecture', Addision Wesley
3. ARM Architecture Reference Manual